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Technical Memorandum

TO: Neil Thompson, U.S. Environmental Protection Agency
Mike Kuntz, Washington State Department of Ecology

FROM: Lawrence D. Beard, P.E. LB
Landau Associates, Inc.

RE: COLBERT LANDFILL RD/RA PROJECT
QUALITY ASSURANCE PLAN FOR ONSITE
METEOROLOGICAL MEASUREMENTS

DATE: December 28, 1990

1.0 INTRODUCTION

This technical memorandum presents the onsite Meteorological Measurements Quality Assurance Plan (Plan) for the Colbert Landfill RD/RA project (Project). This Plan was developed by Mr. Thomas J. Lockhart, CCM, of the Meteorological Standards Institute (MSI), in conjunction with Landau Associates, Inc. It was developed in accordance with U.S. Environmental Protection Agency (EPA) quality assurance (QA) guidance for meteorological measurements (EPA 1989), and supplements the Quality Assurance Project Plan (QAPjP) previously approved by EPA and Ecology (Landau Associates 1989).

The scope for meteorological measurements is based on discussions between Spokane County, EPA, Ecology, and Landau Associates representatives, and is documented in Landau Associates' October 25, 1990 technical memorandum (attached). The Plan is a stand-alone document for meteorological measurements, but the reader should refer to previously approved Project work plans for a more complete description of other Project aspects.

2.0 PROJECT DESCRIPTION

Air quality modeling is required for the Project to assess the need for air stripping tower offgas abatement during Phase II activities. EPA guidance (EPA 1988) suggests that, although National Weather Service meteorological data are adequate for basic modeling, refined modeling (if needed) should be accomplished using meteorological data collected onsite. EPA guidance also recommends that at least one year of meteorological data be used for air quality modeling.

The need for refined air quality modeling and associated onsite meteorological data cannot be evaluated until sometime in 1991. However, onsite meteorological data collection will be initiated as soon as practicable to avoid potential Project delays, should one year of onsite meteorological data be needed. This Plan describes the QA program for collection of these onsite meteorological data.

The meteorological data system will measure and record the following variables using a Campbell Scientific, Inc. CR-10 data logger:

- Wind speed (hourly average) - scalar in meters per second (mps) measured with a Young Wind Monitor AQ (05305) at a height of 10 meters
- Wind direction (hourly average) - unit vector in degrees of arc measured with a Young Wind Monitor - AQ (05305) oriented with respect to TRUE NORTH at a height of 10 meters; sigma theta (hourly, based on four 15-minute values) - by Yamartino method in degrees of arc
- Temperature (hourly average) - in degrees C from a Campbell thermistor probe (107) mounted in a Young aspirated radiation shield (43408) at a height of 2 meters.

3.0 PROJECT ORGANIZATION

This meteorological monitoring project is under the direction of Mr. Lawrence D. Beard, Landau Associates, Inc. Technical assistance and audit services for meteorological measurements is provided by Mr. Thomas J. Lockhart, CCM (MSI). Meteorological system installation, calibration, operation, and maintenance will be accomplished by Landau Associates' site personnel who report directly to Mr. Beard; Spokane County personnel may operate the meteorological system when Landau Associates' personnel are not onsite. The data quality control function will be under the direction of Mr. Beard.

4.0 QA OBJECTIVE

The QA objective of this Plan is to produce valid meteorological data for use in air quality modeling. Achievement of this QA objective will be evaluated based on review of instrument calibration records, and examination of the data between calibrations for conformance to meteorological principles, internal consistency, and agreement with other representative measurements. An external QA contractor (MSI) will document the achievement of this goal.

Valid data are those which meet or exceed the accuracy requirements specified in Ambient Monitoring Guidelines for Prevention of Significant Deterioration (PSD) (EPA 1987), as follows:

- Wind Speed - 0.25 mps for winds between 0.5 and 5 mps
  - 5 percent of reading between 5 and 50 mps
- Wind Direction - 5 degrees with respect to TRUE NORTH
- Temperature - 0.5 degrees centigrade (°C) for plume rise application.

5.0 CALIBRATION METHOD AND FREQUENCY

The minimum performance audit methods will be the same as the calibration methods described in this section. The calibration methods will be used by the instrument operator. The performance audit methods will be used by an independent auditor. The audit method is called a "minimum" because auditors may devise methods which will challenge the system and its subsystems to a fuller extent than those presented herein.

The system calibration frequency will be 6 months; the first calibration will be accomplished within 2 months of the beginning of the data collection period. The calibration will document the performance of the system at the end of each 6-month period. Once a year an audit will be used in place of a calibration. The operator who normally does calibrations will be present during the audit, and any problems encountered by the auditor will be corrected at once. Any changes made will be reported in the log book.

The following subsections present the calibration methods that will be utilized for the Project.

5.1 AS-FOUND ORIENTATION CHECK

A. Verify that the sensor crossarm is pointing to TRUE NORTH (see 5.6 below). Record any error.

B. Lower the tower until it is at rest on a temporary support such as a saw horse. Be sure the aspirated radiation shield is not damaged by this action.

C. Connect a laptop computer or comparable device to the data logger and apply monitoring software so that each sample location is or can be displayed.

D. Hold the tail of the vane parallel to the crossarm (this simulates a south wind with the Wind Monitor mounted to the south end of the crossarm).

E. Record the output location reading. The combination of orientation error (found in "A") and the difference from 180 degrees of this reading should be less than 2 degrees. (Note: If the direction output value cannot be observed while the vane is being held, change Step 02 in data logger instruction 09:P92 to 1 and hold the vane parallel to the crossarm for a full minute. The recorded value can be retrieved and substituted for the instantaneous reading.)

F. Verify that the orientation ring is tight. When the Wind Monitor is removed and re-installed, the orientation will be preserved by the pin in the orientation ring.

5.2 WIND SPEED THRESHOLD CHECK

A. Remove the Wind Monitor from the tower and mount it on the VANE ANGLE BENCH STAND (Young 18112) without engaging the tail-holding arm.

B. Record or verify the model number and serial number of the sensor.

C. Remove the propeller and record or verify the model number and serial number of the propeller. If serial numbers are not found, mark the propeller hub with some symbol which can be recorded.

D. Install the PROPELLER TORQUE DISK (Young 18310).

E. Verify that the disk is in balance with the anemometer assembly. Set the orientation of the line of screw holes to a variety of positions (at least six) and verify that the disk does not turn when released. If this proves difficult, mark an index line on the disk and the anemometer nose assembly. Add tape or other balancing weights to achieve equilibrium at any position of the line of screw holes when the index lines are aligned.

F. Set the line of screw holes horizontal and install a 0.1 gram (g) screw at 1 centimeter (cm) from the center on the left side as seen looking at the disk from the front. This imposes a 0.1 g-cm torque in the same direction as the wind would turn the propeller.

G. If, as a result of this torque, the disk moves 5 degrees or more when released from horizontal, record the starting torque. If it does not, increase the torque by moving the screw farther from the center until the starting torque is found. Record the value.

H. Calculate the starting speed by dividing the torque by 3.8 (the K value for a carbon fiber propeller) and taking the square root of the result. Record this value as the starting threshold in mps.

I. If the starting torque is greater than 1 g-cm, which represents 0.5 mps, a bearing change in the anemometer assembly or other remedial action is required. Do not take such action until Section 5.4 has been completed. When changes have been made, repeat Sections 5.2 and 5.4.

5.3 WIND DIRECTION THRESHOLD METHOD

A. With the Wind Monitor still mounted on the bench stand (without the vane-holding arm in place), verify that there are no wind forces on the vane. It may be necessary to move into a building or vehicle to remove all bias from wind forces. The bench calibrator must be level. Test the lack of wind and static balance by moving the vane to a variety of positions and noting the lack of motion when the vane is released.

B. Mount the VANE TORQUE GAUGE (Young 18331) to the top of the vane such that the tip force is applied 6 cm from the center of rotation in the direction of the vane. For guidance, the black line at the end of the white plastic T section (where the nose cone and the tail assembly are attached) is 6 cm from the center of rotation.

C. Apply pressure to the tip of the torque gauge until the vane begins to move in a clockwise direction. (WARNING: Inertia is the enemy of this method. Find the lowest force by progressively applying the force more slowly or gently until the feel of this measurement is understood.) Continue the test from each stop point until the vane has turned 360 degrees. Note the maximum reading for this test. Repeat the test in the counter-clockwise direction. Record the maximum reading from the tests in both directions. Multiply this maximum number of grams by the 6 cm distance to get the starting torque in g-cm.

D. Calculate the starting speed by dividing the torque by 37 (the K value for a Wind Monitor AQ vane at 10 degrees) and taking the square root of the result. Record this value as the starting threshold in mps.

E. If the starting torque is greater than 12 g-cm (0.57 mps), an alternative method for starting torque measurement should be tried. One alternative is to remove the nose cone and tail vane to greatly reduce the inertia problem and the influence of small wind currents. If the starting torque is clearly greater than 12 g-cm, consider a bearing change in the direction vane assembly and/or the potentiometer. Do not change bearings or potentiometers before completing Section 5.5 below. If bearing or potentiometer changes have been made, repeat Sections 5.3 and 5.5.

5.4 WIND SPEED ACCURACY METHOD

A. Install the vane-holding arm on the VANE ANGLE BENCH STAND. Tighten the V-shaped holder in a two-point contact position with the vane boom. Place a rubber band over the top of the holder to keep the vane in place.

B. With the propeller removed, mount the ANEMOMETER DRIVE (Young 18801) to the Wind Monitor. Screw the shaft coupler to the propeller shaft. Adjust the motor and coupler so the fingers of the coupler are in the middle of the ribbed part. The motor shaft should be in line with the anemometer shaft. A final adjustment can be made when the motor is running by loosening the motor clamp and then tightening it when vibration is at a minimum.

C. Set the data logger data collection period to 15 minutes, as described in Section 6.0.

D. Set the speed to 600 revolutions per minute (rpm); 06 on the digital switch. This rate of rotation is 10 revolutions per second (rps). The propeller pitch is 0.294 meters per revolution (mpr). The simulated speed is, therefore, 2.94 mps. To convert to miles per hour (mph), multiply by 2.237 yielding 6.58 mph. To convert to knots (kts), multiply by 1.944 yielding 5.72 kts. Record the observed speed from the laptop monitor along with the target speed. Run the motor for a full 15-minute recording period. Note the direction indication used for the 15-minute test.

E. Set the speed to 1200 rpm; 12 on the digital switch. The simulated speed is 5.88 mps (13.15 mph). Record the steady speed from the laptop monitor along with the target speed.

F. Set the speed to 2400 rpm; 24 on the digital switch. The simulated speed is 11.76 mps (26.31 mph). Record the steady speed read from the laptop monitor along with the target speed.

G. Verify that each observed speed is within 0.5 mps of the target speed. [Note: They will be within 0.1 mps if the calibrator motor is turning at the correct rate of rotation and the data logger multiplier (P3, 05:.0980) is set for 0.294 mpr (0.294/3 = 0.0980).]

H. For a one-time verification of full range operation, set the speed to 4800 rpm and 9600 rpm representing 23.52 mps and 47.04 mps, respectively. Record the steady speeds read from the laptop monitor along with the target speeds.

I. Remove the calibrator motor and re-install the propeller, being sure that the smooth side of the hub is forward.

5.5 WIND DIRECTION ACCURACY METHOD

A. Set the direction indicator on the VANE ANGLE BENCH STAND to 180 and record the output read from the laptop monitor. The alignment pin on the bench stand is equivalent to the pin on the alignment clamp. Therefore, the same output should be recorded when the vane is parallel to the crossarm as when the indicator is at 180.

B. Move the indicator to the following positions and record the output readings: 210, 240, 270, 300, 330, 000, 030, 060, 090, 120, and 150.

C. Subtract the fixture setting from the output reading for each of the 12 positions.

D. Calculate the average difference and subtract it from the reading to set the distribution equally around zero. The average difference of the new set of 12 values will be 0. Verify that the difference between each of the new values and the fixture setting is less than 3 degrees. (Note: Values in the open segment of the potentiometer may be greater than 3. If the open segment difference is greater than 3, remove it from the calculation of the average difference and accept it as an infrequent error which will be averaged out in normal operation.)

E. If the difference between one of the new values and the fixture setting is greater than 3 degrees, for a point other than the open segment, a change in potentiometer is indicated.

5.6 WIND DIRECTION ORIENTATION METHOD

Two methods are presented for calibrating wind direction orientation. Method 1 will be used for initial vane alignment. Method 2 will be used for subsequent alignment calibration checks and audits.

Method 1:

A. Establish and mark a point between 50 and 100 meters due south of the tower using standard land surveying techniques. A line from this point through the center of the tower will indicate TRUE NORTH (see Method 2.b. regarding determination of TRUE NORTH).

B. Standing at the survey point, the crossarm should be in line with TRUE NORTH with the wind sensor post on the south side of the lightening rod. If the crossarm is not aligned with TRUE NORTH, adjustment is required. Adjustment of the crossarm alignment is an iterative procedure that requires lowering the tower to make progressively smaller adjustments to the crossarm orientation. Once the crossarm is properly aligned, the following steps (C. through E.) should be used to properly align the Wind Monitor.

C. With the tower down, install the Wind Monitor alignment clamp on the sensor post, followed by the wind monitor, with the sensor junction box at the south end of the crossarm. Be sure the alignment clamp pin is engaged with the Wind Monitor slot. Tighten slightly so the two pieces are together but can be turned by hand.

D. With the cables connected and the wind direction output available, hold the wind vane parallel to the crossarm. Turn the sensor base and alignment clamp until the output reads 180. Tighten the alignment clamp and verify the reading is still 180. Tighten the sensor clamp.

E. Return the tower to its upright position.

Method 2:

A. Find a point 50 meters or more south of the tower. Assume the instrument crossarm is oriented on a north-south line. Verify that this point is in line with the crossarm by moving slightly to either side of the point and observing the crossarm. Binoculars or a telescope will help to find this point. At 50 meters, a perpendicular movement of 0.45 meters (1.5 feet) equals one half degree movement with respect to the tower. Find the point where the crossarm has no apparent angle to the observer.

B. Using the longitude and latitude of the location of the station (to the nearest 0.01 degree or half mile) and the time and date of interest, find the location of TRUE NORTH by the solar observation method. See the Quality Assurance Handbook for Air Pollution Measurement Systems, Volume IV - Meteorological Measurements, Section 4.2.4.3.2 for method description (EPA 1989). Alternative methods, such as surveying, map location, or careful compass readings may be used.

C. With a sighting protractor set to TRUE NORTH, find the bearing to the tower. If the assumption in 5.6 Method 2a. is correct, the bearing should be 360 degrees.

D. Subtract the bearing from 360. If the difference is greater than 2 degrees, verify the TRUE NORTH finding and bearing finding and note the difference in the log book. This difference is a bias which can be removed from the data, or the crossarm can be adjusted to within 2 degrees of TRUE NORTH. Record any adjustment made.

5.7 AS-LEFT TEST

A. Replace the Wind Monitor on the tower.

B. Check that the laptop computer is still connected to the output of the data logger and the monitoring software is operating.

C. Hold the vane parallel to the crossarm as though the wind were blowing from the south.

D. Record the laptop reading. (Note: If the laptop value cannot be observed while the vane is being aimed, change Step 02 in data logger instruction 09:P92 to 1 and hold the vane on target for a full minute. The recorded value can be retrieved and substituted for the laptop reading.)

E. Verify that each of the other variables is reporting a reasonable value. If the averaging time (Step 02 in instruction 09:P92) was changed to 1, change it back to 60 or whatever period of time is selected for operational purposes.

F. Remove the laptop and verify the system is operating.

G. Elevate the tower and check the guy lines for proper tension.

H. Verify that the crossarm is still in alignment, as described in Section 5.6.

5.8 TEMPERATURE ACCURACY METHOD

A. Record the model and serial numbers from the aspirated radiation shield (Young 43408). Note and record that air is flowing through the shield.

B. Remove the temperature sensor (CSI 107) from the shield and record its serial number.

C. Prepare a thermal mass to assure a stable temperature near freezing.

D. Cover the temperature sensor with a thin plastic bag to keep any liquid from contacting the thermistor or its wires. Place the sensor in the thermal mass along with a calibrated thermometer.

E. After equilibrium has been reached, record the temperature of the calibrated thermometer and the output temperature read from the laptop computer.

F. Repeat Steps C. through E. using a temperature near 20°C. For this test, leave the sensor at equilibrium ambient temperature for the 15-minute data period for final storage check.

G. Repeat Steps C. through E. using a temperature near 40°C.

H. Verify that at each of the three temperatures the thermistor indicated a temperature within 0.5°C of the calibrated thermometer. If a larger error is found, verify the error by using a different calibrated thermometer. If the error is verified, correct the calibration of the thermistor or replace the thermistor.

I. Remove the protective plastic from the thermistor probe and re-install it in the aspirated radiation shield.

6.0 DATA FLOW ANALYSIS

The calibrations described in Section 5.0 use instantaneous data values. It is necessary to document and verify the accuracy of processed data, which go to the final data storage locations. Set the data collection period to 15 minutes (change Step 02 in data logger instruction 09:P92 from 60 to 15) and verify the following:

A. A steady speed and direction, as set in 5.5A and 5.4C, are correctly recorded in final storage after 15 minutes.

B. The sigma theta value for the period used in 5.5C is less than 0.1 degree.

C. The steady ambient temperature from 5.8F is correctly recorded in the final storage.

The arithmetic methods by which the samples are combined to represent a 15-minute period must be documented and understood. The following procedure will test wind speed and direction processing. With the time in data logger instruction 09:P92 Step 02 changed from 60 to 15, set the following values for wind direction and speed for the times indicated (be sure time is synchronized with the data logger):

Time	Wind Direction	Wind Speed	
(min)	(degrees)	(rpm)	(mps)
00-01	330	400	1.96
01-02	335	500	2.45
02-03	340	600	2.94
03-04	345	700	3.43
04-05	350	800	3.92
05-06	355	900	4.41
06-07	000	1000	4.90
07-08	005	1100	5.39
08-09	010	1200	5.88
09-10	015	1300	6.37
10-11	020	1400	6.86
11-12	025	1500	7.35
12-13	030	1600	7.84
13-14	035	1700	8.33
14-15	040	1800	8.82
True values:			
Arithmetic (scalar)	005.0		5.39
Unit vector	005.0		
True vector	013.7		5.07
Sigma theta	21.6		

This procedure should produce values in final storage as follows:

Wind speed = 5.39 ±0.25 meters per second
Wind direction = 5 ±3 degrees of arc
Sigma theta = 21.6 ±0.5 degrees of arc.

This software test only needs to be conducted once to document the algorithms in the data logger are operating properly. Be sure to return 09:P92, 02: from 15 to 60 when the test has been completed.

7.0 VALIDATION AND REPORTING METHODS

Validation of the data rests with the calibrations and audits. The data stream from the station will be inspected weekly at the start of operation, and bi-weekly thereafter, to assure no intermittent malfunctions have occurred. Hard copy listings of the hourly values will be inspected and stored. Computer graphics will be used to form weekly or bi-weekly time plots of each variable. Inspection of these plots will uncover unusual data which can be further investigated by reviewing the listings.

This procedure will identify any special weather conditions that may cause data errors, which do not appear during routine calibrations or audits. For example, freezing rain or cloud (fog) icing may cause the anemometer and vane to stop turning without any degradation to the long-term starting threshold. Inspection of the data will uncover errors of this kind so they can be flagged or removed from the final database.

Other examples of anomalous data to watch for are:

- 6 daylight hours with wind speed less than 0.5 mps
- 18 hours of wind direction within same 10 degree range
- 1 hour temperature change of greater than 5°C
- 12 hours within a 0.5°C temperature range
- Maximum temperature between midnight and dawn.

The data from this station will be filed as hard copy listings and in files on floppy disks. Transfer of data in the field from the CR-10 to a portable computer will result in a file being created in the computer. The command TELCOM will result in a file called CALVERT.DAT. This file will be copied to a separate floppy disk and renamed with a sequential number, i.e., COL001.DAT, COL002.DAT to COL030.DAT as bi-weekly files for a year. The station log book will record these files by number and date copied. The floppy disk will be sent to Mr. Beard for inspection and editing into a sequential database. Storage of the software programs will be an integral part of the data package.

8.0 AUDITS - PERFORMANCE AND SYSTEM TYPES

Performance audits are discussed in Section 5.0. The performance audit methods will be no less complete than the calibration methods described in Section 5.0 and performance auditors will be experienced and independent of the operator-calibrator personnel. The results of the performance audit, including as-found and as-left conditions, will be summarized in an audit report.

9.0 PREVENTIVE MAINTENANCE

The calibration and audit activities will document that system performance is within the requirements of PSD guidelines. Preventive maintenance is not required for this system, except as specified by the manufacturers of the component parts.

10.0 QA PROCEDURES

Specific procedures are difficult to define for a variety of possible auditors. At a minimum the QA procedure will include the following steps:

A. Verify the existence of a written Project Description, Project Organization and QA Objective.

B. Verify the existence and continuing use of a station log (instrument log) in which are entered the data from calibrations and dates of performance audits. All log entries must be signed and all auditors identified. Audit reports may be separate documents but their existence and custody must be in the log book.

C. Verify the flow of data from the system installation and calibration to the present with special attention to data quality checks: who does them, how often, and how are problems reported.

11.0 CORRECTIVE ACTION AND REPORTS

All problems encountered which cannot be solved by calibration or adjustment will be noted in the log book. If repairs are necessary, a corrective action report describing the planned corrective action will be provided to Mr. Beard for approval. The corrective action will be implemented upon approval of Mr. Beard, and documented in the corrective action report. The corrective action report will be placed in the Project file to document completion of the corrective action. EPA and Ecology will be informed of the corrective action, and will be provided a copy of the corrective action report upon request.

REFERENCES

Landau Associates. 1989. Colbert Landfill RD/RA Quality Assurance Project Plan. Prepared for Spokane County Utilities Department, Spokane, Washington, by Landau Associates, Inc., Edmonds, Washington. September 28, 1989.

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U.S. Environmental Protection Agency. 1989. Quality Assurance Handbook for Air Pollution Measurement Systems, Volume IV - Meteorological Measurements. U.S. EPA, Office of Research and Development, Research Triangle Park, NC.

Technical Memorandum

TO: Neil Thompson, U.S. Environmental Protection Agency
Mike Kuntz, Washington State Department of Ecology

FROM: Lawrence D. Beard, P.E.
Landau Associates, Inc.

RE: COLBERT LANDFILL RD/RA PROJECT
CHANGES TO THE PHASE I AIR MONITORING
AND AIR MODELING ACTIVITIES

DATE: October 25, 1990

INTRODUCTION

On October 1, 1990, a meeting was held at EPA Region 10 offices in Seattle, Washington. The purpose of the meeting was to discuss modifications to the scope of Phase I air monitoring and air modeling activities for the Colbert Landfill Project (Project). The meeting was attended by Mike Kuntz and Clint Bowman of the Washington Department of Ecology (Ecology); Neil Thompson, Marsha Lee, and Rob Wilson of the U.S. Environmental Protection Agency (EPA); Lyle Diedieker of Ecology and Environment; Dean Fowler of Spokane County; and Larry Beard of Landau Associates.

The meeting was held at the request of Spokane County (and Landau Associates) because recent discussions with EPA and Ecology air quality personnel indicated that the scope of Phase I air monitoring and air modeling, described in previously approved work plans, varied from procedures typically used by EPA for assessing air quality impacts. The purpose of the meeting was to develop a scope for air quality assessment that is consistent with EPA guidance, and acceptable to both the regulatory agencies and Spokane County.

BACKGROUND

Section V.D. of the Colbert Landfill Consent Decree Scope of Work (SOW) specifies that the need for air stripping tower offgas abatement during Phase II will be evaluated based on lifetime cancer risk (for carcinogenic compounds) and hazard indices (for noncarcinogenic compounds). Offgas treatment will not be required if increased carcinogenic risk and hazard indices are below 10^{-6} and 1, respectively. Preliminary air modeling (accomplished during negotiation of the SOW), using a simple Gaussian model, estimated lifetime cancer risk and hazard indices to be 3.5×10^{-7} and 1.4×10^{-4}, respectively. However, the analyses were based on limited data, and the SOW specified that additional air monitoring and air modeling would be accomplished during Phase I to refine this preliminary assessment.

The scope of Phase I air quality assessment activities was presented in the Quality Assurance Project Plan (Landau Associates, September 1989) and the Treatment and Discharge Plan (Metcalf and Eddy, July 1990). The scope includes:

- Collecting and analyzing a limited number of ambient air quality samples during operation of the Phase I East System pilot studies
- Collecting onsite meteorological data, including wind speed, wind direction, ambient air temperature, barometric pressure, and precipitation
- Accomplishing air dispersion modeling using onsite meteorological station data and National Weather Service (NWS) data from the Spokane International Airport, and calibrating the modeling results to the air quality data collected during the East System pilot studies.

This scope was reviewed and approved by EPA and Ecology as part of the Phase I Work Plan review process.

SCOPE MODIFICATIONS

Discussions during the October 1 meeting resulted in a number of agreed to changes for the Phase I air monitoring activities. Additionally, some minor modifications were made to the proposed air modeling activities, and a more clearly defined approach to air modeling was also agreed to. The following subsections describe these agreed to changes. Modifications to existing work plans required to bring the existing work plans into conformance with the agreed to scope are presented in Attachment A.

AIR QUALITY MONITORING

The accuracy of air quality models for stack emissions, such as those that would result from an air stripping tower, is well documented and does not typically require verification using ambient air quality monitoring. As a result, air quality monitoring during Phase I activities will not be required.

METEOROLOGICAL DATA COLLECTION

EPA guidance recommends that at least 1 year of meteorological data be obtained for air quality modeling purposes, including onsite meteorological data (if used). However, it will not be possible to assess the need for onsite meteorological data until Phase I field activities are near completion. Because at least 1 year of onsite meteorological data would be required, it is necessary to initiate collection of meteorological data as soon as practicable to avoid potential project delays, even though the data may not be needed.

A meteorological station was set up at the Colbert Landfill site in April 1990. This meteorological station was set up and operated in a manner consistent with NWS data collection procedures. However, EPA guidance on meteorological data collection for regulatory modeling applications (EPA/450/14-87/013) recommends equipment specifications and data collection methods that are different than those presently in use at the site. As a result, modifications to the existing meteorological station will be accomplished to conform to EPA guidance. The following decisions on the scope for meteorological data collection and the data collection methods were made with the concurrence of EPA and Ecology representatives:

- A quality assurance (QA) plan for meteorological data collection will be developed and submitted to EPA and Ecology for review and concurrence
- Meteorological equipment and data collection methods will be in conformance with applicable EPA guidance
- Meteorological parameters to be monitored include horizontal wind speed and wind direction and ambient temperature; temperature difference will not be monitored
- A 10-meter tower height for collecting wind speed and wind direction will be adequate for the project
- The meteorological station can either be left at its existing location (providing the surrounding soil piles are flattened appropriately), or the unit can be located on top of one of the flattened mounds; Landau Associates has decided to leave the meteorological station at its present location.

AIR MODELING

EPA guidance (EPA/450/4-88/010) suggests a three-phase approach for air quality modeling:

- Phase 1: Simple screening procedure (screening modeling)
- Phase 2: Detailed screening procedure (basic modeling, if needed)
- Phase 3: Refined analysis (refined modeling, if needed).

The health risk assessment requires evaluation of exposure over a 75-year period and the project life (assumed to be 30 years) for carcinogenic risk and hazard indices, respectively. These time spans preclude the use of screening modeling (Phase 1). However, annual average concentrations calculated using basic modeling (Phase 2) procedures, or equivalent procedures, are appropriate for evaluating health risk. The following decisions regarding the approach to air modeling were made with the concurrence of EPA and Ecology representatives:

- The Industrial Source Complex (ISC) air dispersion model is appropriate for use on the Project
- The health risk assessment will be based on annual average concentrations
- The initial air dispersion modeling will be accomplished using basic modeling (Phase 2) procedures, and NWS STAR summary data from the Spokane International Airport will be used for meteorological data input
- If the results of the basic modeling are inconclusive, refined modeling (Phase 3) will be accomplished. Refined modeling will follow the same procedures as basic modeling, except onsite meteorological data will be used instead of NWS data.

CONCLUSIONS

Because of the need for long-term onsite meteorological data collection, it is important that EPA and Ecology promptly identify any air quality issues where their understanding differs from that expressed in this memorandum. If any such disagreements are not identified by November 12, Spokane County will proceed with implementation of the air monitoring and modeling scope described herein. Changes to the scope for air quality assessment identified after November 12 may result in delay to design and construction of the Phase II system.

The work plan modifications described in Attachment A constitute Landau Associates' understanding of how the decisions described in this memorandum affect the existing work plans. Because the Project is in the advanced stages of Phase I activities, revising the work plans and submitting a new copy to EPA and Ecology does not appear warranted. As a result, the changes described in Attachment A will serve as documentation for these work plan modifications. If appropriate, these modifications will be incorporated into the Phase II work plans.

LDB/njb
No. 124-01.35
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Attachment

ATTACHMENT A

The elimination of Phase I air quality monitoring will result in the following Phase I Work Plan modifications:

- Quality Assurance Project Plan
    - Remove all references in the document to NIOSH
    - Section 1.3, page QA-1-5: Remove all references to air quality monitoring from Project Objective 2
    - Section 3.1, page QA-3-4, Table QA-3.2: Delete reference to air as a sample matrix
    - Section 4.2, page QA-4-2, Table QA-4.1: Delete air as a sample matrix
    - Section 6.1, page QA-6-1: Delete the last sentence of Paragraph 2
    - Section 6.2, page QA-6-2: Delete the reference to air sampling pumps in the first sentence of the first paragraph. Delete the third sentence of the first paragraph
    - Section 6.2, page QA-6-4, Table QA-6.2: Delete the reference to air sampling pump
    - Section 7.0, page QA-7-4, Table QA-7.2: Delete table.
    - Section 9.1.1, pages QA-9-1 and QA-9-2: Delete the last sentence of the section
    - Section 9.1.2, page QA-9-2: Delete the last sentence of the section
    - Section 9.1.3, page QA-9-2: Delete the last sentence of the section
    - Section 9.1.4, page QA-9-3: Delete the last two sentences of the section
    - Section 9.1.5, page QA-9-3: Delete the last sentence of the section
    - Section 9.1.6, page QA-9-4: Delete the last sentence of the section
    - Section 9.1.8, page QA-9-4: Delete the second paragraph of the section
    - Section 13.0, page QA-13-2: Delete the second to last sentence of the first bullet
    - Delete the third reference from the reference list
    - Appendix QA-A, Section 1.0, page FS-1-1: Delete the reference to air as a sample medium in the first sentence of the second paragraph
    - Appendix QA-A, Section 3.0, page FS-3-2: Delete the fifth bullet
    - Appendix QA-A, Section 3.0, page FS-3-3: Delete the last sentence of the second paragraph
    - Appendix QA-A, Section 3.0, page FS-3-5, Table FS-3-1: Delete reference to air samples

- Appendix QA-A, Section 4.0, page FS-4-1: Delete reference to air sampling in the first sentence
- Appendix QA-A, Section 4.1, page FS-4-2, Table FS-4-1: Delete reference to air matrix
- Appendix QA-A, Section 4.3: Delete section and all subsections
- Appendix QA-B: Remove the air sampling data sheet.

• Phase I Treatment and Discharge Plan:
  - Section 2.5, page TD-2-30: Modify the first paragraph to indicate that the necessity for air emissions abatement will be determined using meteorological data, but not onsite air quality data
  - Section 2.5.2: Delete the last sentence
  - Section 2.5.3: Delete the reference to air sampling in the first sentence of the first paragraph. Delete the reference to air quality sampling in the second sentence of the first paragraph
  - Section 2.5.3: Delete the third and fourth paragraphs
  - Section 2.5.4: Delete the section.

The changes to the meteorological data collection activities described in the technical memorandum result in the following change to the Treatment and Discharge Plan:

• Section 2.5.2: The third sentence needs to be modified to indicate horizontal wind speed and wind direction, and ambient air temperature data will be collected at the onsite weather station.

The air modeling procedures described in the technical memorandum result in the following changes to the Treatment and Discharge Plan:

• Section 2.5: The first paragraph needs to be modified to indicate that air modeling will first be accomplished using NWS data from the Spokane International Airport, and if needed, air modeling will be accomplished using onsite meteorological station data
• Section 2.5.2: The section needs to be modified to indicate that the meteorological data required will be obtained from the NWS for basic modeling, and will be collected from the onsite weather station for refined modeling (if needed).